

CONSERVATION OF COAL
&
MANUFACTURE OF GASOLINE

READ

BY

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AT

THE HYDERABAD CENTRE

OF

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CONSERVATION OF COAL.

Coal is a non-renewable commodity. Take the Singareni mine in our Dominions. It is being closed as the coal left in barriers and supports cannot be removed economically. It may be possible to dig out the barriers and supports, by providing a system of packing, built in from the spoil of rock removed. This process is being tried now in Europe, but it is too expensive to be adopted in our country, as the price of coal is very low. The question of conserving coal is a very important aspect, and has to be considered by Government. It is evident, that the industrial and commercial development of our country, depends on the price of coal, or in other words on the cost of power made available at a relative low price, when compared to our neighbours.

The only way to increase the prosperity of a country is to provide cheap power. This is possible, if coal is conserved and not wasted, as is being done now by allowing the raw coal to be exported to the neighbouring provinces.

The process of low temperature carbonization has been very successful of late, and great economy would result if the raw coal used at present in the raising of steam, for the production of power and domestic heating, is prevented by Government, and only semi-coke allowed to be exported or utilised in our Dominions.

The advantages that will accrue from carbonization are:—

1. Atmosphere of the towns will be polluted to a very much less degree, and the health of populace improved.
2. Prevention of waste of national resources, by burning the valuable volatile hydro carbons contained in the coal.
3. Large quantities of tar will be available. This can be utilised in our Dominions for the production of valuable tar products.
4. Ammonium sulphate, the most useful chemical fertiliser, can be produced in fairly large quantities.
5. The resulting soft semi-coke can be utilised for raising steam in the production of electric energy, and also used for domestic heating.
6. Production of large quantities of gasoline or motor spirit, by Hydrogenation.

It has been agreed, by all industrialists, that the most economical means of applying power to industries is by using electric energy which can be generated by Hydro or Thermal plants.

In our Dominions we have both the resources available; but as coal is an exhaustible unit, it should be allowed to be used more economically, by establishing large low temperature Carbonization and Hydrogenation plants, and utilising the soft coke for the pro-

duction of electric power in Thermal plants. In 1937 the quantity of coal actually produced and sold by our mines was nearly one million tons. It will be interesting to know that if this quantity was Carbonized and Hydrogenated, the products would have been:—

Soft coke	..	..	7,00,000	Tons
Tar	..	..	15,000	„
Ammonium sulphate	..	..	5,000	„
Gasoline	..	..	15,00,000	Gallons.

These products are now lost; thereby constituting a great waste of National resources. It has been agreed by experts that the magnetic ore, available in our Dominions is more amenable to treatment in electric furnaces. Hence soft coke can be used for the production of Electric energy, to be utilised for the manufacture of steel in electrical furnaces when sufficient Hydro-Electric Power is not available from the river Godavari during 6 dry months of the year.

The scheme as now investigated is to establish the steel works at Antargaon, on the right bank of the river Godavari, and use the magnetic ore available in the Ambaripet area, which is within 20 miles of the Kazipet-Balharshah Railway, for the manufacture of steel. From the preliminary estimate drawn up by Mr. Laik Ali, the quantity of rich ore, with Fe 46 to 66%, available in the Ambaripet area alone, is nearly 100 million tons.

It is proposed to instal a steel making plant for an annual production of 50,000 tons, as a first stage; and duplicate the works when demand is increased. For

a production of say 1,00,000 tons of steel annually, the ore required will be approximately 3,00,000 tons, with a fair margin for wastage, which means that the quantity of ore available in the Ambaripet area alone will be enough to carry on production for more than 500 years. Even if annual output of steel is increased to one million tons, the ore in Ambaripet area, together with the equal quantity of ore available in Chitaly group, can supply sufficient quantity to last for nearly 100 years.

The Hydro Power available for six months, for the first stage of production of 50,000 tons of steel will be 24,000 K. W. delivered at site of work. During the dry-weather flow for six months only 3,000 to 6,000 K. W. can be supplied by Hydro, and the balance of 18,000 to 21,000 K. W. will have to be generated by a Thermal plant installed at the steel works. At this rate, the thermal plant will require for six months 1,40,000 tons of soft coke for the generation of electric power. In order to produce this quantity of soft coke, according to the experiment carried out at our laboratory, nearly 2,00,000 tons of coal will be necessary. If a Carbonization and Hydrogenation factory is established at Bellampalli adjoining the coal mines, the coal can be purchased at Rs. 2-8-0 per ton, and the soft coke sold to the steel works at Rs. 3-0-0 per ton. The by-products from 2,00,000 tons of our coal Carbonized and Hydrogenated will be approximately:—

Soft coke	...	...	1,40,000 Tons
Tar	...	...	3,000 "

Ammonium sulphate	...	...	1,000 Tons
Gasoline	...	...	3,00,000 Gallons

When the steel plant is duplicated to produce 1,00,000 tons of steel annually the coal required will be 4,00,000 tons and the Carbonization plant can then also be duplicated. The Carbonization and Hydrogenation Plant that is to be installed for the steel works, as a first stage, will be comparatively much smaller than the plant proposed in Australia which is to deal with 8,60,000 tons of coal annually; producing nearly 20 million gallons of Gasoline.

The approximate cost of the Hydrogenation plant will be one crore of rupees and the manufacturing cost of gasoline, allowing 4% interest on capital, depreciation etc., will be about five annas per gallon, as per details attached.

The profit accruing to Government will be 11.25 lakhs, as Excise revenue, at six annas per gallon; and if half the capital is provided by Government, the profit will be 3.75 lakhs more, or in all 15 lakhs i. e. 30% on the capital invested.

			B.G. Rs.
Cost of manufacture of Gasoline.			
(a)	2,00,000 tons of coal		
	at Rs. 2-8-0 per ton		5,00,000
(b)	Chemicals etc.		1,30,000
	Total	..	6,30,000

(c) Wages, salaries, depreciation, and interest on capital, as per detail below:—

	B.G. Rs.	B.G. Rs.
1 Manager ..	24,000 per annum.	
1 Chemist ..	18,000	
1 Asstt. Manager ..	9,000	
2 Laboratory Assistants	6,000	
110 Workmen ..	33,000	
6 Artisans ..	3,600	
3 Foremen ..	6,400	
(d) Depreciation 2½% on one crore ..		1,00,000
(e) Interest at 4% on one crore ..		2,50,000
(f) Overhead charges etc. ..		4,00,000

Total .. 15,80,000

Credits:—

1,40,000 tons of coke at 3/- per ton ..	4,20,000
3,000 tons of tar at 40/- per ton ..	1,20,000
1,000 tons of Ammonium Sulphate at 100/- per ton ..	1,00,000

Total Credits 6,40,000

Net cost .. 9,40,000

That is to say, the cost of 3 million gallons of gasoline is Rs. 9,40,000 or approximately annas five per gallon. With excise at annas six per gallon, and allowing only four annas profit, gasoline can be sold at fifteen annas per gallon and the net profit after paying interest charges, will be 7.5 lakh sor 7½% on

capital. The development of low temperature carbonization industry has made a slow progress in England though an enormous amount of research has been carried out during the last 10 years. England has now realised the advantages accruing. Had she adopted the system earlier, there would have been no shortage of petrol to-day. In the Continent of Europe nearly half the total consumption of petrol is met by gasoline produced from coal.

It has been estimated that the total annual output of the United Kingdom is over 300 million tons of coal, and out of this 200 million tons is reserved for home consumption. If this 200 million tons of coal was carbonized, the annual product of gasoline would have been over 3,000 million gallons, besides the other valuable by-products. Similarly, if a complete system of electrification was established, a saving of 55 million tons of coal or £ 27.5 millions would result annually.

A fuel research Board was appointed in Great Britain in 1917. Since then, a research station has been established at East Greenwich London, with full equipment. Low temperature carbonization has been intensively studied, and some 1,600 tons of coal were treated by this method in 1927.

Experiments are being carried out under my instructions in our Industrial Laboratory; but not having proper equipment, the research cannot be conducted in a plant of a size used in commercial practice.

It has been established by chemical experts that by the addition of a very small percentage of Hydrogen our non-caking coal can be made to coke quite satisfactorily. I propose therefore that a fuel research section may be established in our Laboratory, and a small Pilot Plant, fully equipped, purchased from England or America as early as possible. The capacity of the plant need not be more than 1 ton of coal a day.

A note drawn up by me was sent to Messrs T. & W. Morgans, London. They have stated also "that much work is being done, so that a successful method may be expected."

Major Crosslegh, Agent of Singareni Collieries Company in London has also recommended that after the Laboratory tests are satisfactory a Pilot Plant should be installed, so that a fair quantity of coal in bulk is treated, to ascertain whether the process is going to be a commercial success.

The smallest Pilot Plant fully equipped was costing, before the war, about £2,500. If an American Plant is purchased now, it may cost £3,500 or O.S.Rs.

	55,000
Add carriage, building, erection etc. . .	20,000
Add Catalysts, Chemicals etc. for ..	
tests of 300 tons of coal. ..	10,000
Add extra establishment etc. required	
for one year ..	15,000
Total ..	1,00,000

The total cost of the Pilot Plant and detail tests for one year will be only a lakh, which is not very much considering the expenditure incurred in England, which amounts to £80,000 to 90,000 per annum. It may be mentioned here that this fuel research section, will also be able to test the suitability of other fuels available in the Dominions, for utilisation as a cheap power producer.

Finally it is hoped that Government will sanction Rs. 1,00,000 for the present for one year, for coal research and entrust the work to the Industrial Laboratory which should be controlled by an Industrial Research Board.

(SD.) AHSAN YAR JUNG.

APPENDIX.

1. Quantity of gas produced from coals by carbonization.

(a) Standard (Average). One gram, produces 280 cc. equal to 10,000 cft. per ton.

(b) Bellampalli coal. One gram, produces 300 cc. equal to 10,714 cft. per ton.

(c) Ballampalli coal with addition of 5% Hydrogen. One gram, produces 315 cc. equal to 11,250 cft. per ton.

2. Estimated production of Gasoline from the proposed plants by Hydrogenation under pressure with a catylist.

	LIGNITE FROM VICTORIA-AUSTRALIA	BLACK LIGNITE FROM BELLAMPALLI
(a) Coal	860,000 tons.	200,000 tons
(b) Soft Coke	64% (per cent)	70% (per cent)
(c) Dried Tar	1.58% (per cent)	1.5% (per cent)
(d) Gasoline	20 to 21 gallons per ton of coal.	15 gallons per ton of coal
(e) Ammonium Sulphate	Not given.	0.5% (per cent)

3. Composition of Lignites.

Coal From	Moisture. %	Volatiles. %	Ash %	Fixed Car- bon %	Calorific Value B. T. U.
(a) Victoria .. (well dried)	14.9	53.56	1.8	46.44	Not given
(b) Bellampalli. (Not dried) raw.	7.18	29.37	16.25	47.20	10872

4. Composition of Cokes.

Coal from.	Moisture. %	Coke. % (of coal)	Volatiles. %	Ash %	Fixed Car- bon %	Calori- fic value.
(a) Victoria.	Not given	64	36.0	Not given	Not given	Not given
(b) Bellam- palli ..	Nil.	70	3.47	27.50	69.00	9936
(c) Sakchi Iron works (Recovery ovens) ..	13	Not given	0.71	14.86	71.43	Not given
(d) Barakar Iron works (Recovery ovens) ..	Not given	do	29.15	15.00	55.30	do
(e) Barakar (Open kilns)	3.88	do	Not given	26.69	69.43	do

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